

Urinary Tract Infection Due to *Salmonella Stanleyville* in an Otherwise Healthy Child

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A healthy four-year-old boy developed a febrile urinary tract infection (UTI) due to *Salmonella stanleyville*. The UTI developed following an episode of enteritis due to the same organism. *Salmonella* UTI is uncommon and is reported more often in patients with a predisposing factor, such as immune deficiency or a structural abnormality, in the urinary tract. *Salmonella stanleyville* has not been previously reported as a cause of UTI.

Key words: urinary tract infection ■ enteritis ■ *Salmonella stanleyville* ■ healthy child

Urinary tract infection (UTI) due to nontyphoidal strains of *Salmonella* is uncommon and usually develops in an individual with a predisposition.^{1,2} We report an otherwise healthy four-year-old boy who developed a UTI following an episode of enteritis due to *Salmonella stanleyville*. To our knowledge, UTI caused by *Salmonella stanleyville* has not been previously reported.

CASE REPORT

A four-year-old boy presented to the emergency department with a one-week history of fever as high as 40°C and a 24-hour history of abdominal pain, dysuria and urinary frequency. Ten days prior to assessment in the emergency department, he had an afebrile diarrheal illness without blood or mucous in the stool. No abdominal pain or tenesmus was noted. *Salmonella stanleyville* was isolated from a stool specimen. His past medical history was unremarkable. In particular, he had no prior history of UTI. He was circumcised in the neonatal period. He started to void on his own at 18 months and was dry by day and night from two- and three years of age, respectively. Typically he voided about four-to-five times a day without urgency. The description of his urinary stream was normal. He did not need to wait or push to initiate voiding, and the stream was straight, strong and continuous. There was no history of redness or irritation at the tip of his penis. He had a soft, formed bowel movement at least once a day, and his parents routinely wiped the perianal area after each movement. There was no family history of immunodeficiency.

On examination, his temperature was 38.1°C, respiratory rate 32 breaths/minute, heart rate 120/min, and blood pressure measured with an appropriate sized cuff in the right arm supine was 85/50 mmHg. There was tenderness in the suprapubic area. There was no tenderness in the flanks or the costovertebral angles. His urethral meatus was of adequate caliber and was not inflamed. The examination was otherwise normal.

A urinalysis showed a cloudy-appearing urine with a pH of 5.5, specific gravity >1.030, 1+ proteinuria,

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trace ketone, moderate bacteria, and >30 white blood cells per high power field. The hemoglobin was 127 g/L, white blood cell count 12.5×10^9 /L, neutrophils 4.2×10^9 /L, bands 0.7×10^9 /L, lymphocytes 7.4×10^9 /L, monocytes 0.1×10^9 /L, and eosinophils 0.1×10^9 /L. His serum sodium was 137 mmol/L, potassium 4.1 mmol/L, chloride 102 mmol/L, bicarbonate 23 mmol/L, creatinine 43 μ mol/L, urea 4.5 mmol/L and glucose 6.6 mmol/L. A midstream clean-catch specimen of urine yielded a pure growth of *Salmonella stanleyville*, with a colony count of 1×10^7 to 1×10^8 CFU/L. The organism was sensitive to ampicillin and trimethoprim-sulfamethoxazole. The patient was treated with 80 mg of trimethoprim (4 mg per kg/day), and 400 mg sulfamethoxazole (20 mg per kg/day) for 10 days. A urine culture obtained seven days after completion of treatment was negative. Screening tests to investigate the possibility of an immunological predisposition were normal, including immunoglobulin G 12.34 g/L, immunoglobulin A 1.77 g/L, immunoglobulin M 1.19 g/L, third component of complement 1.66 g/L, and fourth component of complement 0.42 g/L. A voiding cystourethrogram performed two months after presentation was normal. A renal ultrasound performed four months after presentation was normal.

DISCUSSION

The principal reservoirs for nontyphoidal strains of *Salmonella* are the gastrointestinal tracts of animals, including poultry, livestock, pets and reptiles.³ *Salmonellae* are transmitted courtesy of fecal-oral spread and often gain access to the body as a consequence of ingestion of contaminated food or water. Gastroenteritis is the most common manifestation of nontyphoidal salmonellosis.

Salmonellae infect the urinary tract either by direct urethral invasion followed by ascending infection or by hematogenous spread.^{4,5} The most common route outside of the neonatal period is presumed to be ascending infection. Our patient presented with *Salmonella* UTI at the age of four years and within two weeks following an afebrile episode of enteritis due to the same organism. As such, an ascending route for the infection is most likely.

UTI due to *Salmonella* is uncommon. Saphra and Winter, in a large review of 7,779 nontyphoidal *Salmonella* infections in adults, found only 49 cases (0.63%) of UTI.⁶ Green et al. reported that only eight (0.033%) of 24,000 positive urine cultures performed at the Bellevue Hospital in New York City were positive for a *Salmonella* species.⁷ According to data collected by the Centers for Disease Control over a 12-year period from 1968 to 1979, *Salmonella* isolates from urine accounted for only 1.4% of all isolates.⁸ UTI due to *Salmonella* in a patient without a predisposing condition is uncommon and accounts

for only 0.63% of all *Salmonella* UTI.⁹ Common predisposing situations include immunodeficiency, structural abnormality of the urinary tract, nephrolithiasis, indwelling urinary catheter or other foreign body, pregnancy, chronic illness and overactive sexual activity.^{2,3,10,11} Our patient had a structurally normal urinary tract and no evidence of an immunological problem. We are aware of a few reported cases of *Salmonella* UTI in otherwise-healthy individuals who do not have a predisposing condition. Allerberger et al. reported UTI due to *Salmonella* in two otherwise-healthy young women aged 16 and 22 years of age, respectively.¹² Recently, Buchta and Dunn reported three healthy children aged 8-, 12- and 16 years of age, respectively, who had UTI due to *Salmonella* species.¹³ We agree with Buchta and Dunn that although rare, *Salmonella* UTI do occur in healthy children and adolescents, especially in the presence of gastroenteritis.

Salmonella species heretofore reported to cause UTI include *S. typhimurium*, *S. typhi*, *S. manhattan*, *S. oranienburg*, *S. saint-paul*, *S. heidelberg*, *S. infantis*, *S. enteritidis*, *S. newport*, *S. agona*, *S. thompson*, *S. montevideo*, *S. anatum*, *S. derby*, *S. javiana*, *S. panama* and *S. blockley*.^{1,3,8} We are not aware of any previous report of UTI due to *Salmonella stanleyville*.

Enteritis due to nontyphoidal *Salmonella* species is not routinely invasive, and antimicrobial therapy is not indicated in the absence of toxicity or other systemic symptoms. The UTI in our patient was associated with fever and therefore compatible with pyelonephritis. UTI due to nontyphoidal *Salmonella* species should be treated regardless of whether there is associated toxicity or other systemic symptoms.¹⁴

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